THE TREATMENT OF VARICOSE ULCER AND VEINS*

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DISCUSSION *by Nelson J. Howard, M.D., San Francisco; E. Vincent Askey, M.D., Los Angeles; Norman J. Kilbourne, M.D., Los Angeles.*

THE injection treatment of varicose veins is at this time so generally accepted by clinicians that the operative excision method is considered more or less obsolete. Kilbourn,[1] after an extensive survey, including questionnaires to many leading clinics, considers the morbidity following the injection method so favorable, as compared to the operative excision, that the latter is coming to be regarded as both relatively dangerous and unsatisfactory. This survey included over fifty-four thousand cases.

Personal experience, including over eight hundred persons treated for varicose veins and ulcers by the injection method during the past seven years, has led me humbly to offer certain observations, which must certainly add evidence as to the safety and value of this procedure.

PHYSIOLOGY AND ANATOMY

In the erect posture, the propulsive action of the heart beat and arterial pressure have little influence on the venous circulation of the lower extremity. The extensive area of the capillary bed, as compared to the cross section of the artery, produces an almost zero pressure. The deep venous circulation is produced by the pumping action of the muscles of the leg as they press on the veins, which in turn are equipped with valves to prevent back flow.

It is this pumping action of the leg muscles which propels the blood from one vein chamber to the one above, thus producing an upward emptying of the veins. Any condition which cripples this venous pump, such as incompetence of the valves, immobilization in a plaster cast, etc., cripples the venous flow from the leg, unless the extremity is elevated to approximately the level of the heart. The superficial veins do not have this muscular support, and hence are not directly influenced by this muscle-pumping action. However, they are provided with numerous communicating branches, with their valves so placed that there is a constant onward flow into the deep veins.

Negative pressure during respiration and positive abdominal pressure are other factors in producing venous circulation.[2] As the abdominal veins have no valves, increased abdominal pressure sends the blood back against the veins in the legs, as well as into the thorax. Thus, during violent abdominal straining, the back pressure into the veins of the thigh is greatly increased; but as the deep veins are supported by the muscles of the leg, the superficial veins are subject to the full pressure. If we consider this intra-abdominal pressure, plus a normal hydrostatic pressure, we can easily conceive why varicose veins are so common.[3] I am convinced that mechanical back pressure is the major explanation of varicose veins, although we must consider congenital and hereditary weakness, as well as other undetermined factors which we are unable to recognize.

The valves in the communicating veins between the superficial and deep circulation are of major importance. If these valves are competent, the blood flows from a superficial dilated varix into the deep circulation, and no harm is done, except to add to the burden of the deep veins. This type of varix is manifested clinically as fatigue and heaviness in the leg, which the victim does not usually associate with his veins. However, if the communicating veins do not have competent valves, the surface varicosities are not as effectively decompressed. In this instance, blood from the deep veins leaks into the superficial group and reënters at another communicating vein lower down, thus producing a vicious circle. This phenomenon has been demonstrated many times under the fluoroscope, following Lipodol injections.[4]

VARICOSE ULCER

The venous back pressure on the capillary circulation becomes most abnormal and extensive. As capillary permeability is known to be affected by this back pressure and also by the increase of carbon dioxid and the lack of oxygen, there are produced definite nutritional changes in the leg.[5] Pigmentation, as the result of increased capillary permeability and diapedesis of red blood cells, is a most important diagnostic sign of impaired nutrition caused by varicose veins, even though the veins are not visible.[6] This condition precedes the development of what is termed "varicose ulcer." When the actual ulcer does develop, there is added to the already devitalized area the element of infection, accompanied by edema or cellulitis.

TREATMENT OF VARICOSE ULCER

Varicose ulcers, as we all know, respond to any treatment which relieves the venous back pressure and increases the capillary circulation through the tissues. Thus, rest in bed, with elevation of the affected leg, will invariably be of benefit. It has been our practice in these cases, when we consider the deep circulation patulous, to sclerose chemically all visible varicose veins by the injection method. The ulcer locally is dressed with a dry, absorptive dressing and compressed tightly with an elastic bandage, under which is placed a soft rubber sponge. At night the sponge and the bandage are removed, and the leg is elevated so as to utilize the force of gravity, to stimulate venous circulation.

In a series of fifty-three cases of chronic varicose ulcer treated by this method, the clinical results, as observed by accurate follow-up, have more than fulfilled our expectations. Some forty-five have reported complete cures; three report a return of the ulcer and from five we have received no answer to our communications.

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MALIGNANT LEG ULCERS

When the deep veins have been damaged by a phlegmasia albadolens or a severe phlebitis, the problem of treatment becomes more complex. In this condition, there is not a diminution in the caliber of the veins, but an incompetence of the valves. Hence, we have venous back pressure greatly increased and the capillary pressure diminished. These cases present a pitiful but characteristic picture—edema, ulceration, infection and, in some cases, elephantiasis. Varicosities are also present, but chemical obliteration by sclerosing agents is of little benefit, as in this condition the deep tissues as well as the superficial are involved. Bandages also are of little aid. Any grafting operation will not succeed on account of the poorly nourished tissues.

TREATMENT OF MALIGNANT ULCER

Recently in treating this type of ulceration, we have used an ambulatory method consisting of frequent elevations of the leg, which utilizes the force of gravity to empty the veins of stagnant blood. The patient places a rope and pulley over the foot of the bed, and for five minutes each hour during the day, reclines and suspends the affected leg perpendicularly from the pulley. At night, the leg is elevated on pillows. As far as we know, this method is original, and in the few cases upon which we have based our observations, the results have been most satisfactory. Following this ambulatory treatment, or after a long continued rest in bed with constant elevation of the leg, the edema and induration will subside and the ulcer may be operated according to the method of Homans.[7] The entire ulcer area, including the scar tissue and underlying fascia, should be excised and Thiersch grafts laid on the deep tissues.

PRELIMINARY TESTS

Before proceeding with the obliteration of the varicose veins, it is necessary to determine the patulousness of the deep venous circulation and also absence of arterial disease. In obese individuals, it is often difficult to accurately locate the femoral-saphenous opening; hence the Trendelenberg test in our practice has been supplemented by a modification of the Perthe test.

Instead of applying the tourniquet above the knee, the foot and leg are tightly bound with an adhesive elastic bandage, and the patient is instructed to walk for fifteen minutes. If no pain is produced by this procedure, we consider the deep venous circulation patulous and feel that it is reasonably safe to proceed with the injection of the varicose veins. It is most important that a careful medical examination be made and syphilis be eliminated. Any deformities of the feet should be corrected. Fallen arches particularly should be supported by strapping or by properly fitting appliances.

SOLUTIONS USED

We have used at times practically all the sclerosing solutions which have been suggested—20 to 30 per cent sodium chlorid, 50 per cent glucose or dextrose, 50 per cent invert sugar, 2 per cent quinin and urethan, 30 per cent sodium salicylate; but have found that for general use, a 3 to 5 per cent aqueous solution of sodium morrhuate is the least toxic and the most satisfactory.

TECHNIQUE OF INJECTION

The sclerosing solution is injected with the patient either standing or sitting, in order to distend the veins and make the introduction of the needle easier. As soon as the needle enters the vein, the leg is elevated so as to bring the chemical into direct contact with the intima. We rarely use a tourniquet except in sclerosing segments of very large varices. Never more than one or two veins are injected during the treatment, in order to minimize any disability which may occur.

It has been our practice to follow each injection with an infiltration of Ringer's solution.[8] This procedure dilutes any of the sclerosing agent which may have escaped accidentally into the tissues, thus preventing sloughs. Following the injection, when the resulting thrombus is large, the application of an elastic bandage will give much support and comfort. In small veins this is not necessary.[9] We feel that ligation of the internal saphenous vein is an unnecessary procedure, and have discontinued the practice.

SUMMARY

1. The injection treatment is a safe and practical procedure for the obliteration of varicose veins in properly selected cases.

2. In simple trophic leg ulcer the obliteration of existing varices is a valuable therapeutic aid, provided the valves of the deep veins are competent.

3. For leg ulcer associated with edema, cellulitis, pigmentation and evidence of deep valvular incompetence (malignant ulcer), the injection of existing varices is of little benefit. Treatment should include frequent emptying of the vein by gravity, compression by bandages, and excision followed by skin grafts.

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DISCUSSION

NELSON J. HOWARD, M. D. (350 Post Street, San Francisco).—None of us will disagree with Doctor Schmoele in regarding injection thrombosis as the treatment of choice in dealing with varicose veins. It is very important for every practitioner to have in mind the altered physiologic and anatomic factors present in this condition, and so well summarized by Doctor Schmoele, in order to be able to treat competently the varied pathologic stages presented by the individual varicose patient. The gravity method of relief of venous stasis and tissue edema is a very valuable one and, as emphasized by Doctor Schmoele, does not take the place of compression bandage therapy, but supplements it. The use of the rubber or sea sponge beneath the elastic compression is not necessary, in my experience, if *sufficient* and *continued* elastic compression is maintained. Unna's paste boots applied to the huge, soggy, edematous limb without compression, fail to accomplish a cure of the ulcer. Previous elevation of the limb and gravity reduction of the edema, followed by the application of a Kleebro elastic adhesive bandage (or less comfortable, an Ace elastic bandage), and reinforced by repeated layers of Unna's paste, gives good continued sufficient elastic support to allow the ulcer to heal. It goes without saying, that the veins should receive thrombosing injections.

I do disagree with Doctor Schmoele in his use of the term "malignant ulcer," which, with accuracy, should be reserved for actual neoplastic changes arising in the scar of a healed ulcer, or in the unhealed margins of a long-existing chronic ulcer. My own belief is that every varicose ulcer can be healed, except those in which the deep veins are of insufficient caliber, and in which repeated thrombosis prevents sufficient recanalization to restore an adequate lumen for return of blood to the body. Edema, ulceration and infection may exist, but as long as the deep veins are sufficiently patent, competent or incompetent, I feel the ulcer can be healed by simple means. Long duration of the ulcer, presence of edema and eczema are no bar to success, and these cases cannot justly be said to possess a malignant ulcer. Huge ulcers, unhealed for 40, 31 and 22 years, with brawny edema and eczema, but with patent deep veins, have responded with healing in eight weeks or less, if obliteration of superficial veins is combined with adequate continued elastic support. Operation and skin-grafting were found unnecessary. Doctor Schmoele rightfully emphasizes the necessity of testing for *sufficiently* deep vein patulousness. In ulcer cases, with occlusion of the deep set of veins, I have not as yet found a satisfactory method of treatment.

A real advance would be secured if the medical profession as a whole would attempt the prevention of varicose veins. Varicose veins have no common cause. In certainly a third of the patients, they first are manifest in adolescent or early adult years, presumably through a congenital type of variation in vein-valve development. However, the thrombophlebitis following childbirth, operation, infectious diseases and trauma, are followed in a surprising number of cases by varicosities. Early and continued use of elastic support of the limbs of those patients with thrombophlebitis or edema is imperative, whether the condition follows childbirth, operation, or trauma. Adequate support to the superficial saphenous system, from the moment the patient is ambulatory, prevents the increase of edema, accelerates the recanalization of the deep thrombi, and tends to prevent or minimize future development of varicosities of the superficial saphenous system.

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E. VINCENT ASKEY, M. D. (1930 Wilshire Boulevard, Los Angeles).—The injection treatment of varicose ulcer and veins has received, deservedly, so much discussion in the past few years that a simple understandable presentation of the factors involved and the treatment now in use is of practical value.

Doctor Schmoele has outlined in clear language the problem—the necessary Trendelenberg and Perthe tests (which are so often unknown to or neglected by the physician with little experience in this problem), and he has given the exact technique and the precautions to be observed, so that I feel therein lies the value of his paper. It is concise, definite, inclusive.

Doctor Schmoele's procedure, of regular hourly elevation of the leg in the treatment of "malignant" ulcer, I feel is a worthwhile innovation in that it avoids absolute inactivity and allows the patient to be ambulant. The morale of the patient and his coöperation will be increased because he will feel that something definite and of great importance is being done which he can see and of which he is a definite part. The psychology of this in itself is of value, and this procedure could be adopted with profit by all of us in the treatment of this condition.

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NORMAN J. KILBOURNE, M. D. (2007 Wilshire Boulevard, Los Angeles).—The author is correct in advising pressure with the rubber sponge instead of the now antiquated Unna's paste boot. He is also right in the use of a dry dressing. Strips of cellophane paper across the wound will keep the dressing from sticking. This is a better treatment than the use of the many ointments.

In the treatment of ulcers associated with chronic infection of the lymphatics, hot compresses are helpful.

When there is a question as to whether pain in the legs is due to varicose veins or fallen arches, it is more likely to be due to varicose veins. However, certain cases, in which pain persists after injection of veins, will be relieved if referred to an orthopedic man for arch support.

Solution of sodium morrhuate is valuable in small veins where there is a possibility of extravasation, for the sloughs due to extravasated sodium morrhuate will heal more quickly than sloughs due to extravasated quinin. Sodium morrhuate is a soap which is so very variable in composition that potassium oleate is preferable. Potassium oleate is a similar soap, which is not only cheaper but definite and of invariable composition and effect.

In cases where there is a history of phlebitis and also in large veins with increased danger of phlebitis, quinin urethane solution is still preferable because it is bactericidal. The quinin remains in the tissues for more than five days and so affects the surface tension on the outside of the leukocytes that it prevents phagocytic action which might loosen the thrombus. Potassium oleate with a small amount of quinin added is now available. The author's attitude on ligation of the saphenous vein is correct.

PIGMENTATION OF METABOLIC ORIGIN: ITS RELATION TO THE AUTONOMIC NERVOUS SYSTEM*

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DISCUSSION *by H. P. Jacobson, M.D., Los Angeles; Sophie A. Lurie, M.D., Los Angeles; George V. Kulchar, San Francisco.*

THIS discussion is intended to be limited to the influence of the autonomic nervous system on abnormalities of pigmentation. The influence of light on pigmentation will not be touched upon. Neither will the causes of various hematogenous pigmentation be gone into. An attempt will be made to explain certain facts about metabolic pigmentation and the formation of melanin.

ORIGIN OF PIGMENT

Certain types of pigment definitely originate in extravasated or stagnant blood, but melanin definitely does not originate from the blood. It contains neither sulphur nor iron, which are essential elements in blood. Moreover, Eirowsky[1] has shown that melanin production can occur in portions of skin which have been cut off from the general circulation, and also in Thiersch grafts *in vitro*.

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